

# Mars atmosphere modelling and observations workshop

## *Program*

- Notice that, in Spain, lunch is usually after 2pm and dinner after 9pm
- The time allocated to each presentation does NOT include questions and discussion
- In each session, a total amount of time is allocated for questions and discussion. This flexible time will be managed by the (brilliant) session chairmen.

**Monday, January 13, 2002**

**Monday, session 1 8:30 – 11:00** (Presentation: 83' ; questions and discussion : 42' ; registration 25')

- **8:30 – 8:55 : Registration**
- **8:55 : Welcome and introduction (5')**

### ATMOSPHERIC DYNAMIC

*Chairman: Peter Read*

#### **OBSERVATIONS:**

- TES and THEMIS instrument description and thermal structure observations  
(2 abstracts : 1) TES: *M. D. Smith, B. J. Conrath, J.C. Pearl and P.R. Christensen* ;  
2) THEMIS: *M. D. Smith, J. L. Bandfield, M. I. Richardson, and P. R. Christensen* 25'
- Planetary eddies in the Martian atmosphere: FFSM analysis of TES data  
(*J.R. Barnes*) 10'
- Results from radio occultations with Mars Global Surveyor  
(*D. P. Hinson and R. J. Wilson*): 20'
- The orbital (Ls) variation of thermal structure over the 60-80 km Mars atmospheric region  
(*R. T. Clancy, B. J. Sandor and G. Moriarty-Schieven*) 10'
- Atmospheric wave structure derived from Mars Global Surveyor Horizon sensor data.  
(*T. Z. Martin and J. R. Murphy*) 10'
- *Poster presentation* : Forced and traveling waves in the Martian atmosphere from MGS  
TES nadir data (*D. Banfield, B. Conrath, R. J. Wilson and M. Smith*) 3'

**11:00 – 11:30 : Coffee break**

**Monday session 2 : 11:30 – 13:15** (Presentation: 70' ; questions and discussion : 35')

*Chairman: Jeff Barnes*

- The effect of the 2001 Martian global dust storm on middle atmosphere emissions due to the  
10  $\mu\text{m}$  non-LTE CO<sub>2</sub> hot bands observed by MGS/TES (*W. C. Maguire et al.*): 10'
- Mars surface boundary layer meteorology  
(*S. E. Larsen, H. E. Jørgensen, J. Murphy, J. E. Tillman and J. T. Schoffield*) 10'

#### **GENERAL CIRCULATION MODELING**

- The NASA/AMES Mars General Circulation Model: Model improvement and comparison  
with observations (*R. M. Haberle et al.*) 20'
- General circulation simulated by the LMD-AOPP GCM: Update on model design and  
comparison with observations (*F. Forget et al.*) 20'
- Recent advances in the development of a European Mars climate model at Oxford.  
(*P. L. Read et al.*) 10'

**13:15 – 15:00 : Lunch break**

**Monday session 3 : 15:00 – 17:00** (Presentation: 82' ; questions and discussion : 38')

**Chairman: Frédéric Hourdin**

- GCM simulation of thermal tides in the Mars atmosphere  
(*R. J. Wilson, D. Banfield, D. P. Hinson, and M. D. Smith*) 20'
- Zonal mean circulation obtained by a newly developed Martian atmospheric General Circulation Model.  
(*Y. O. Takahashi et al.*) 10'
- Interannual variability in Mars' atmosphere.  
(*A. F. C. Bridger and J. L. Hollingsworth*) 10'
- Cyclogenesis and frontal waves on Mars (*J. L. Hollingsworth*) (title only)

#### **DATA ASSIMILATION**

- Data assimilation for the Martian atmosphere using MGS Thermal Emission Spectrometer observations (*S. R. Lewis et al.*) 10'
- Assimilation of TES data from the Mars Global Surveyor scientific mapping phase.  
(*L. Montabone et al.*) 10'
- Data assimilation of Mars Global Surveyor meteorology  
(*H. Houben*) 10'

#### **POSTER PRESENTATION**

- *Poster presentation* : Towards an intermediate complexity Martian climate simulator.  
(*J. Segschneider et al.*) 3'
- *Poster presentation* : The MAOAM project  
(*P. Hartogh et al.*) 3'
- *Poster presentation* : Breeding vectors and predictability in the Oxford Mars GCM  
(*C. E. Newman, P. L. Read and S. R. Lewis*) 3'
- *Poster presentation* : Carnot thermodynamics of the Martian atmosphere  
(*R. D. Lorenz*) 3'
- *Poster* : Migrating diurnal tides in the Martian atmosphere : numerical investigations  
(*Y. O. Takahashi, H. Fujiwara and H. Fukunishi*)
- *Poster* : Non-LTE model for infrared radiation in the Martian atmosphere  
(*A. Kutepov, W. Maguire, M. Smith, J. Pearl, B. Conrath, A. Feofilov and O. Gusev*)

**17:00 – 17:30 : Tea break**

**Monday session 4 : 17:30 – 19:15** (Presentation: 65' ; questions and discussion : 40')

**Chairman: Miguel Angel Lopez-Valverde**

#### **GENERAL CIRCULATION MODEL INTERCOMPARISON**

- Intercomparison: Lower atmosphere radiative transfer model  
(*H. Savijarvi*) : 10'
- GCM Intercomparison: zonal mean fields  
(*A. F. C. Bridger*) 10'
- GCM GCM Intercomparison: Tides and travelling waves  
(*J. R. Wilson*): 10'

#### **COUPLING OF THE LOWER AND UPPER ATMOSPHERE: ANALYSIS OF MEASUREMENTS ABOVE 90 KM**

- Results obtained with the MGS and Mars Odyssey 2001 accelerometer experiments  
(*G. M. Keating et al.*) 15'
- MGS accelerometer data analysis with the LMD GCM.  
(*M. Angelats i Coll et al.*) 10'
- MGS accelerometer and radio science analysis using the coupled Ames-MGCM / Michigan TGCM  
(*S. W. Bougher*) No abstract 10'

**Posters & wines: Monday 19:15– 20:30**

**Tuesday session 1 :8:30 – 10:15** (Presentation: 70' ; questions and discussion : 35')

**Chairman: Steve Lewis**

**MESO-SCALE MODELLING**

- Reflections on Mars global climate modeling from a mesoscale meteorologist  
(*S. C. R. Rafkin*) 20'
- Development of the Oregon state university Mars MM5 and description of our initial results.  
(*D. Tyler and J. R. Barnes*) 15'
- The Cornell/Caltech Mars MM5 mesoscale model  
(*A. D. Toigo and M. I. Richardson*) 15'
- Two dimensional simulations of Martian mesoscale circulation phenomena: a review and future role  
(*T. Siili, H. Savijärvi, A. Määttänen and J. Kauhanen*) 10'
- Intercomparison of mesoscale models  
(*D. Tyler*) 10'
- *Poster*: Simulating the late-summer atmospheric circulation of the Martian north pole region.  
(*D. Tyler and J. R. Barnes*)
- *Poster*: Numerical modelling of Martian dust devils  
(*A. D. Toigo, M. I. Richardson, and P. J. Gierash*)

**10:15 – 10:45 : Coffee break**

**Tuesday session 2 : 10:45 – 13:30** (Presentation: 125' ; questions and discussion : 40')

**Chairman: Phil James**

**DUST, WATER AND ICE IN THE MARTIAN ATMOSPHERE**

**OBSERVATIONS**

- Mars Orbiter Camera meteorological observations  
(*B. A. Cantor and M. Malin*) 25'
- Mars Orbiter Camera climate observations  
(*M. Malin and B. A. Cantor*) 25'
- TES observations of aerosol optical depth and water vapor abundance  
(*M. D. Smith, B. J. Conrath, J.C. Pearl and P.R. Christensen*) 30'
- Variations in aerosol particle properties for Mars ice and dust clouds  
(2 abstracts: 1) *M. J. Wolff and R. T. Clancy*; 2) *R.T. Clancy and M. J. Wolff*) 20'
- Clouds detected by the Mars Orbiter Laser Altimeter  
(*G. A. Neuman, M. T. Zuber and D. E. Smith*) 10'

**MODELS**

- Dust cycles and storms in a Mars GCM  
(*C. E. Newman, P. L. Read, S. R. Lewis and F. Forget.*): 15'

**13:30 – 15:00 : Lunch break**

**Tuesday session 3 : 15:00 – 16:45** (Presentation: 72' ; questions and discussion : 33' )

**Chairman: Bob Haberle**

- Modelling the Martian water cycle  
(*M. I. Richardson*) 20'
- Water-ice clouds in the LMDs Martian General Circulation Model  
(*F. Montmessin and F. Forget.*) 10'
- GCM simulations of the Martian water cycle  
(*H. M. Böttger, S. R. Lewis, P. L. Read and F. Forget*) 10'
- Simulation of the water cycle  
(*H. Houben, no abstract*) 7'

- The incorporation of water ice cloud microphysics in a Mars General Circulation Model  
(A. V. Rodin and R. J. Wilson.) 10'
- *Poster presentation:* Report on two topics: relationship between the dust and water cycles in the GCM; Dust devils at Pathfinder. (S. M. Nelli and J. R. Murphy) 3'
- *Poster presentation:* Formation, evolution and estimated radiance of surface fogs in low and middle latitudes on Mars (A. Inada, W.J. Markiewicz and T. Mukai) 3'
- *Poster presentation:* Sublimation of water from the North polar cap on Mars. (C. S. Hvidberg and H. J. Zwally) 3'
- *Poster presentation:* Mountain glaciers on Mars? Characterization of western Tharsis Montes fan shaped deposits using MGS data. (J. W. Head and D. R. Marchant): 3'
- *Poster presentation:* Atmospheric and hydrological cycles on Mars related to Tharsis superplume. (J. M. Dohm et al.) 3'

**16:45 – 17:15 : Tea break**

**Tuesday session 4 : 17:15 – 19:00** (Presentation: 69' ; questions and discussion : 36')

**Chairman: David Crisp**

- Intercomparison: GCM/dust transport models  
(C. Newman) 10'
- Intercomparison: water vapour cycle simulation (TBC)  
(M. Richardson) 10'
- Intercomparison: water cloud simulation  
(A. Colaprete) 10'

**ATMOSPHERIC PHOTOCHEMISTRY AND UV IN THE LOWER ATMOSPHERE**

- High resolution spectroscopic observations of Mars : recent results  
(V. Krasnopolsky) 10'
- Photochemistry of the Martian atmosphere  
(R.T Clancy et al.) No abstract 10'
- Coupling a photo chemical model and the LMD GCM  
(F. Lefevre, S. Lebonnois and F. Forget) 10'
- *Poster presentation:* Modelling the annual cycle of carbon monoxide in the Martian atmosphere  
(M. M. Joshi, R. M. Haberle and R. T. Clancy) 3'
- *Poster presentation:* Ultraviolet radiation on the surface of Mars and a UV spectrometer on Mars  
(D. C. Catling et al.) 3'
- *Poster presentation:* Martian Modelling for the design of UV sensors for Mars surface  
(C. Muller, D. Gillotay and D. Moreau) 3'
- *Poster :* A stringent upper limit of the H<sub>2</sub>O<sub>2</sub> abundance in the Martian atmosphere  
(T. Encrenaz et al.)

**19:00 End of session**

**20:00 Busses leaves to the workshop dinner**

<b>Wednesday, January 15, 2002</b>
------------------------------------

**Wednesday session 1 : 8:30 – 10:30** (Presentation: 80' ; questions and discussion : 40')

**Chairman: Wojtek Markiewicz**

**CO<sub>2</sub> CYCLE AND POLAR PROCESSES**

- CO<sub>2</sub> cycle: Two martian years of polar IR observations  
(T. N. Titus et al.) 20'
- Effects of atmospheric dust on the recession of the seasonal south polar cap.  
(P. B. James et al.) 10'
- Martian polar clouds  
(P. G. Ford and G. H. Pettengill): 10'

- Numerical simulation of the winter wave clouds observed by Mars Global Surveyor Mars Orbiter Altimeter (G. Tobie, F. Forget and F. Lott) 10'
- A comparison of Mars GCM carbon dioxide cloud simulations with observations (A. Colaprete and R. M. Haberle) 10'
- Seasonal changes in the masses of the polar ice caps of Mars derived from Mars Global surveyor gravity (D. E. Smith and M. T. Zuber): 10'
- Estimation of temporal changes in the mean global atmospheric pressure on Mars from MGS Doppler tracking (M. T. Zuber and D. E. Smith) 10'

**10:30 – 11:00 : Coffee break**

**Wednesday session 2 : 11:00 – 13:30** (Presentation: 103' ; questions and discussion : 47')

**Chairman: Dave Hinson**

**THERMOSPHERE AND IONOSPHERE**

- The NCAR Mars Thermospheric General Circulation Model: a review (S. W. Bougher, S. Engel and P. Withers) 20'
- Mars' upper atmosphere and ionosphere at low, medium, and high solar activities (W. Krasnopolsky) 10'
- Theoretical 1D model of the energetics, composition and vertical transport of the Martian upper atmosphere (M. Lopez-Valverde, F. Gonzalez-Galindo, M. Angelats-i-Coll, F. Forget, F. Hourdin) 10'
- Fast parameterizations of UV heating and photochemistry for GCM models of the Martian atmosphere (F. Gonzalez-Galindo and M. A. Lopez-Valverde) 10'
- Towards a global model of the martian atmosphere-thermosphere (M. Angelats-i-coll et al.) 10'
- The current status of the UCL Mars thermospheric model (T. Moffat and A. D. Aylward) 10'
- A new Mars ionosphere/airglow model between 60 and 500 km altitude. (O. Witasse et al.) 10'
- Intercomparison : Upper atmosphere radiative transfert model (M. Lopez Valverde) 10'
- Intercomparison : Mars 3D Thermosphere Models (M. Angelats I Coll) 10'
- *Poster presentation* : Development of a surface-to-exosphere Mars atmosphere model. (G. Crowley et al.) 3'

**13:30 – 15:00 : Lunch break**

**Wednesday session 3 : 15:00 – 17:15** (Presentation: 94' ; questions and discussion : 41')

**Chairman: François Forget**

**FUTURE OBSERVATIONS**

**MARS EXPRESS (2003)**

- The Planetary Fourier Spectrometer (PFS) onboard the European Mars Express mission (V. Formisano et al. ) 15'
- *Poster presentation*: PFS: evaluation of atmospheric sounding capabilities (D. Grassi et al.) 3'
- *Poster presentation*: PFS measurements and statistics between orbit 17 and 116 of Mars Express mission. (A. Maturilli, V. Formisano and D. Grassi) 3'
- *Poster presentation*: Validation of Mars General Circulation Models using spectrally resolved data from PFS (C. Fiorenza et al.) 3'
- SPICAM on Mars Express: The atmosphere of Mars from top to bottom (J.-L. Bertaux, S. Guibert, O. Korablev, and the SPICAM team ) 10'
- The Mars Express Orbiter radio science experiment (D. Hinson, M. Paetzold et al.) No abstract 7'

- *Poster presentation* : Optical depth retrievals with the HRSC on Mars Express  
(*N. M. Hoekzema, W. J. Markiewicz and H. U. Keller*) 3'
- *Poster presentation* : Pressure measurements from 2.0 microns CO<sub>2</sub> band by remote sensing : reanalysis of Phobos/ISM and preparation of Mars Express/Omega observations (*Melchiorri et al*) 3'
- *Poster presentation* : Observation of pressure variations in the Martian atmosphere. Potential applications to Omega/Mars Express (*A. Gendrin, S. Erard, R. Melchiorri and P. Drossart*)

#### **MARS EXPLORATION ROVER (2003)**

- Atmospheric Science with Mars Exploration Rover 2003  
(*M. Wolff et al.*) No abstract 7'

#### **MARS RECONNAISSANCE ORBITER (2005)**

- Atmospheric science on the Mars Reconnaissance Orbiter  
(*R. Zurek*) 10'
- Objectives of the Mars Climate Sounder on the Mars Reconnaissance Orbiter  
(*D. McCleese et al.*) 15'

#### **OTHER POSTERS**

- *Poster presentation*: DynAMO, an imaging interferometer for satellite observations of wind and temperature on Mars (*W. E. Ward et al.*) 3'
- *Poster presentation* : Sounding mars by Schumann resonances and electromagnetic transparency  
(*J. A. Morente et al.*) 3'
- *Poster presentation*: Evaluation of geodetic measurement in the determination of Martian global-scale seasonal CO<sub>2</sub> change (*O. Karatekin et al.*) 3'
- *Poster presentation*: Optimal orbits for Mars atmosphere remote sensing  
(*M. Capderou and F. Forget*) 3'
- *Poster presentation*: Observing Mars with large ground-based telescopes using adaptive optics  
(*J. Bailey and D. Crisp*) 3'

#### **17:15 – 17:45 : Tea break**

**Wednesday session 4 : 17:45 – 19:30** (Presentation: 73' ; questions and discussions : 32')

**Chairman: Rich Zurek**

#### **PROJECT BEYOND 2005**

- Netlander ATMIS: overview: objectives and current instrument status  
(*A. M. Harri et al.*) 6'
- Netlander ATMIS wind and temperature instruments  
(*D. Crisp et al.*) 6'
- The Pascal Mars Scout mission  
(*R. M. Haberle and the Pascal team.*) 10'
- The optical depth sensor (ODS) on Netlander and Pascal missions  
*P. Rannou et al.* 6'
- MAMBO : the Mars Atmosphere Microwave Brightness Observer  
(*F. Forget and the MAMBO team*) 10'
- DYNAMO: A Mars upper atmosphere package for investigating solar wind interaction and escape processes, and mapping magnetic fields (*Chassefiere et al.*) 10'

#### **REFERENCE ATMOSPHERE AND DATABASE**

- Mars Global Reference atmospheric model (Mars-GRAM) and database for mission design  
(*C. G. Justus, A. Duvall and D. L. Johnson.*) 10'
- The Mars Climate Database.  
(*S. J. Bingham et al.*) 10'
- Mars International Reference Atmosphere (no abstract)  
(*G. M. Keating*) 5'

#### **Wednesday 19:30 : End of workshop**